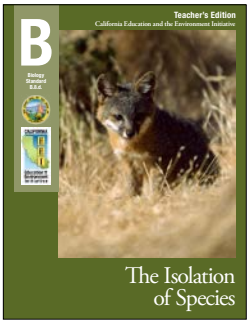
TEACH COMMON CORE STANDARDS
WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

B.8.d.—The Isolation of Species



In this unit, students explore how geographic isolation on islands results in some unusual characteristics among island species, including gigantism, dwarfism, and lack of flight. After learning how speciation can occur through geographic isolation, students learn how human activities and practices can influence this type of isolation. Students also explore how groups of organisms have varying degrees of sensitivity to change and isolation. Students focus on the influence nonnative species have had on native species by examining a variety of case studies. Through this study, students will gain a better understanding of how populations are sensitive to change, how human activity can affect populations, and how population declines affect the overall genetic diversity of species.

LESSONS	RST.9–10.1	RST.9–10.2	RST.9–10.3	RST.9–10.4	RST.9–10.5	RST.9–10.6	RST.9–10.7	RST.9–10.8	RST.9–10.10	RST.11–12.7	WHST.9–10.1	WHST.9–10.2	WHST.9–10.7	WHST.9–10.8	WHST.9–10.9	SL.9–10.1	L.9–10.4
California Connections	✓	✓		✓	✓	✓		✓	✓	✓		✓					
1	✓	✓		✓	✓		✓		✓		✓	✓	✓		✓	✓	✓
2	✓		✓	✓							✓				✓	✓	✓
3	✓	✓		✓			✓				✓		✓	✓	✓	✓	✓
4				✓			✓				✓		✓	✓	✓	✓	✓
5				✓			✓				✓		✓	✓	✓	✓	✓
Traditional Assessment												✓					
Alternative Assessment		✓							✓			✓					

COMMON CORE STANDARDS

Note: *For your reference, the list of California Common Core State Standards abbreviations is on the following page.*

Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

California Common Core State Standards Abbreviations

- **CCCSS:** California Common Core State Standards
- **L:** Language Standards
- **RST:** Reading Standards for Literacy in Science and Technical Subjects
- **SL:** Speaking and Listening Standards
- **WHST:** Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

Note: *Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core Standards and Applications is cited, using "…" to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 22–23 of this document.*

A Note about Common Core Speaking and Listening Standards

Throughout this unit, students participate in various learning structures and groups to analyze, discuss, and synthesize data, which supports the skill in Speaking and Listening Standard 1 "Participate effectively in a range of collaborative discussions (one-on-one, groups…) with diverse partners." With prior instruction on collaborative discussions, these various groupings and the materials students examine lend themselves to prime discussion material for collaborative discussions. Learning structures with tasks for pairs and groups are in the following lessons:

- **Lesson 1:** Whole class, pairs
- **Lesson 2:** Whole class, groups of 4
- **Lesson 3:** Whole class
- **Lesson 4:** Whole class, pairs
- **Lesson 5:** Whole class, pairs

National Geographic Resources

No maps or posters are used with this unit.

Unit Assessment Options

Assessments	Common Core Standards Applications
Traditional Assessment	
Students write short-answer and answer multiple-choice questions.	**WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
Alternative Assessment	
Students read **Island Case Study** (Student Edition, pages 10–11) and provide short answers to 5 questions that parallel lessons in the unit.	**RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or description of a complex process, phenomenon, or concept; provide an accurate summary of the text. **RST.9–10.10:** …read and comprehend science…texts… independently and proficiently. **WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

Lesson 1: Geographic Isolation

Students read about the Channel Islands to learn about geographic isolation. Working with partners they predict which types of mainland organisms have the best chance of reaching the islands. They also study canyons as geographic barriers leading to the formation of species.


Lesson 1

Geographic Isolation

Use this correlation in conjunction with the **Procedures** located on pages 34–37 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson. ***Tip:*** *If* ***Dictionary Workbooks*** *need to be reused from year to year, students should not write in them.*	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
Step 1: Ask students the meaning of the term "geographic isolation" and solicit ideas of what geographic features might cause isolation. Project and study **California's Channel Islands** (Visual Aid #1). ***Tip:*** *Download Visual Aids from http://californiaeei.org for easy access during the lesson.*	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

Student Tasks	Common Core Standards Applications
Steps 2–4: Project **Depiction of Prehistoric Channel Islands** (Visual Aid #2). Students compare changes in island configuration over the last 110,000 years, noting that the once-connected islands are now separated. Project **Getting to the Islands** (Visual Aid #3) while discussing how animals could float to the islands on vegetation mats. Students define "dispersal" and discuss ways organisms could have arrived on the Channel Islands to answer questions in **Geographic Isolation of Species** (Student Workbook, pages 3–4). Students review the "Dispersing to Islands" chart with partners and complete their own charts. Project **Dispersing to Islands** (Visual Aid #4) and discuss students' responses. ***Tip:*** *If* ***Student Workbooks*** *need to be reused from year to year, students should not write in them. Some strategies teachers use to preserve the workbooks are:* ■ Have students use binder paper or other lined or unlined paper ■ Have students use a sheet protector over the page and write with a whiteboard marker ■ Do together as a class on a projector or chart paper ■ Project the digital fill-in version and do together as a class ■ Students use digital devices to fill in the digital version found on the website. ■ Make student copies when necessary	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.
Steps 5 and 6: Distribute a **Student Edition** to each student. Have students read ***California Connections: The Channel Islands—The Galápagos of California*** (Student Edition, pages 2–5). Define "endemic species" and "allopatric speciation". Discuss island geographic isolation. ***Suggestion:*** *Use these discussion questions to allow students to find text to support their answers:* ■ *Why are the Channel Islands of California comparable to the Galápagos Islands of South America?* ■ *Once individuals of a species colonize an isolated area, what factors might influence the chance that they will survive?* ***Suggestion:*** *Refer to the Reading California Connections Using a Common Core Reading and Writing Focus on pages 17–21 to view specific suggestions for integrating Common Core standards while reading the selection not only for content, but for text structure as well.*	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
Step 7: Discuss what other types of geographic features might lead to isolation of species. Project **Distribution of Abert's and Kaibab Squirrels** (Visual Aid #5), **Kaibab Squirrel** (Visual Aid #6), and **Abert's Squirrel** (Visual Aid #7). Discuss the separation of these two populations. Have students note the differences between the squirrels even though they are members of the same species.	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

Student Tasks	Common Core Standards Applications
Step 8: Define "speciation". As a class, review ideas of geographic isolation and speciation. Have students review their list generated in Lesson 1 and revise, remove, or add to the list. For homework, assign Questions 3–5 on page 4 of **Geographic Isolation of Species**. ***Suggestion:*** *Divide students into three groups and assign each group a question to answer for homework. Require students to cite text to support their answers. Prior to the start of the next lesson, have students share their answers with small groups so that everybody has the information. As the students are sharing the information, listen for misconceptions and difficult concepts before moving on. After students have an opportunity to share, have them re-read their answers and highlight vocabulary that is new or unique to this unit. If this suggestion is used, Common Core State Standards RST.9–10.1, RST.9–10.2, RST.9–10.4, RST.9–10.5, RST.9–10.10, WHST.9–10.2, WHST.9–10.7, and WHST.9–10.9, are addressed.*	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **RST.9–10.2:** Determine the central ideas or conclusions of a text…; provide an accurate summary of the text. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*. **RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms… **RST.9–10.10:** By the end of grade 10, read and comprehend science/technical texts…independently and proficiently. **WHST.9–10.2:** Write informative/ explanatory texts, including…scientific procedures/ experiments, or technical processes. b) Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. **WHST.9–10.7:** Conduct…research projects to answer a question…or solve a problem;…synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Lesson 2: Mechanisms of Isolation

Students compare morphological characteristics between island species and their mainland counterparts. They examine examples of subspecies to understand initial mechanisms leading to speciation. They participate in activities to review genetic drift and natural selection. They discuss reproductive isolating mechanisms and examine how these mechanisms influence speciation.


Lesson 2

Lesson 2

Mechanisms of Isolation

Learning Objective

Key Vocabulary

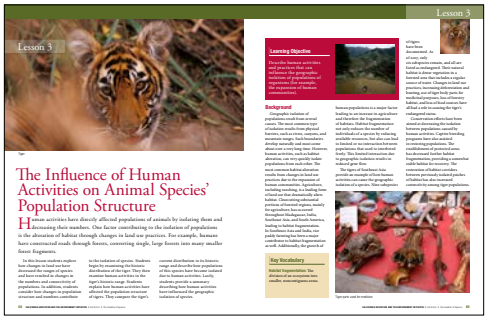
Use this correlation in conjunction with the **Procedures** located on pages 54–56 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
Steps 1 and 2: Review the concept of geographic isolation from Lesson 1. Have students turn to **Mechanisms of Species Isolation** (Student Workbook, pages 5–7). Project **Island Fox versus Gray Fox** (Visual Aid #8), **Island Scrub Jay versus Western Scrub Jay** (Visual Aid # 9), and **Island Redberry versus Redberry (Mainland)** (Visual Aid # 10). Discuss each comparison of island/mainland morphology to answer Question 1 on **Mechanism of Species Isolation**.	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
Steps 3 and 4: Review classification of species. Define "species," "speciation," "subspecies," and introduce "gene flow," "genetic drift," and "sampling effect." Divide the class into groups of 4. Students participate in an activity with beans to demonstrate allele frequencies over several generations. ***Note:*** *Steps for the bean activity are on page 55 of the* ***Teacher's Edition****.*	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.

Student Tasks	Common Core Standards Applications
Steps 5: Project **Galápagos Islands** (Visual Aid #11) and review the island geography. Project **Giant Tortoise Subspecies Morphology** (Visual Aid # 12). Define "morphology." Have students examine and predict the causes of differences between two subspecies of tortoise. Students work in groups of 4, using the bean activity in Step 4 to simulate natural succession in tortoise populations. Students refer to the map **Galápagos Islands** to answer Questions 2.a. and 2.b. on **Mechanisms of Species Isolation**.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
Steps 6 and 7: Project and review **Depiction of Prehistoric Channel Islands** (Visual Aid #2) and **California's Channel Islands** (Visual Aid #1) to answer Question 3 on **Mechanisms of Species Isolation**. Summarize information learned so far on the geographic isolation of species, formation of subspecies, and new species. **Project Island Fox versus Gray Fox** and discuss if the two species would be able to successfully mate. Project **Cheetah and Lion** (Visual Aid #13) and **Galápagos Finch Species** (Visual Aid #14). Discuss if and why hybrids can or cannot be produced from these species.	**RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.
Steps 8 and 9: Define "reproductive isolating mechanism" and discuss what things caused reproductive isolation to happen in lion, cheetah, and finch species. Instruct students to answer Questions 4 and 5 on **Mechanics of Species Isolation**.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.

Lesson 3: The Influence of Human Activities on Animal Species' Population Structure

Students study maps to compare the historic and current distribution of tigers. They explore the human activities that have fragmented their habitat and they describe how these changes influence the geographic isolation of tiger populations.


Lesson 3

The Influence of Human Activities on Animal Species' Population Structure

Use this correlation in conjunction with the **Procedures** located on pages 72–75 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
Step 1: Distribute a **Student Edition** to each student. Project **Tiger Species Information** (Visual Aid #15). Have students turn to **Tiger Species Information** (Student Edition, page 6). Read and review the information as a class. Project and discuss **Tiger Distribution** (Visual Aid #16). Have students turn to **Tiger Distribution Grid** (Student Workbook, page 8) and count and record the number of squares represented as the tigers' historical range. Then students count and record the number of grid squares indicated as the tigers' present range. Students determine how much of the tigers' range is no longer available as habitat. Students discuss causes for this decline. ***Note:*** *Instructions for step-by-step math are found on page 72 of the* ***Teacher's Edition****.* ***Note:*** *Students should understand that field biologists use this technique in the field, and that it is customary for scientists to count a box even if it is only partially filled.*	**RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **RST.9–10.2:** Determine the central ideas or conclusions of a text…; provide an accurate summary of the text. **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

Student Tasks	Common Core Standards Applications
Steps 2 and 3: Project **Rice Paddy Distribution in Southeast Asia** (Visual Aid #17). Tell students the information about deforestation to build rice paddies given on page 72 of the **Teacher's Edition**. Ask students the questions from page 73. Project **Forest Cover of Southeast Asia** (Visual Aid #18). Explain that the historically dense forest has been changed for agricultural use. Lead a discussion about how this change has affected the distribution of tigers. Define and discuss "habitat fragmentation" and how both changed and protected forested areas affect tigers.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.
Steps 4 and 5: Have students turn to **Habitat Change and Species Isolation** (Student Workbook, page 9). Students answer question 1. Use the **Human Activities and Effects on Geographic Isolation Chart** to aid a discussion on the effects of each of the human practices on the geographic distribution of tigers. (Sample answers are provided on page 74 of the **Teacher's Edition**.) Again project **Tiger Distribution**. After a discussion of why the tigers' range has changed dramatically, have students answer Questions 2 and 3 on **Habitat Change and Species Isolation**.	**RST.9–10.2:** Determine the central ideas or conclusions of a text…; provide an accurate summary of the text. **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.7:** Conduct…research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.9–10.8:** Gather relevant information from multiple authoritative…sources (**primary and secondary**)… **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Student Tasks	Common Core Standards Applications
Steps 6 and 7: Students view a teacher-led demonstration (with steps listed on page 74 of the **Teacher's Edition**) on how genetic diversity decreases in smaller populations, followed by a discussion on why it is detrimental to the survival of a species to have low population numbers. Have students summarize how human activities and practices have influenced the geographic isolation of populations of tigers in Question 4 on **Habitat Change and Species Isolation**. ***Suggestion:*** *Provide students an opportunity to exchange information with each other before sharing out with the entire class.*	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.

Lesson 4: Effects of Introduced Species

Students observe examples of nonnative species and predict how they influence the survival of native species. They examine documented consequences of these introductions on native species and write a summary describing how nonnative species contribute to the reproductive or geographic isolation of native species.


Lesson 4

Effects of Introduced Species

Learning Objective

Key Vocabulary

Use this correlation in conjunction with the **Procedures** located on pages 88–89 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
Steps 1 and 2: Distribute a **Student Edition** to each student. Project **Nonnative Species 1** (Visual Aid #19) and **Nonnative Species 2** (Visual Aid #20). Have students turn to corresponding pages **Nonnative Species** (Student Workbook, pages 10–11) and **Changes in Populations** (Student Edition, pages 7–8). Review the charts with students. Explain that they will use the information in columns 2–4, along with information from class discussion, to complete the next three columns. Project **Changes in Population** (Visual Aid #21) and explain to students that this chart provides a description of various activities that influence populations of plants and animals. It also provides examples of how nonnative species influence native species. Display **Blackberry** (Information Card #1). As a class, review columns 2–4 on **Nonnative Species 1** for blackberries. Have students refer to the **World** wall map to determine geographic features that have inhibited the blackberry's colonization around the world. Have students fill in the name of the "former barrier" on **Nonnative Species**. ***Suggestion:*** *Post each of the Information Cards in a different part of the room. Allow students to work in small groups and move from card to card to complete their charts as this will encourage collaboration and focus attention.*	**RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.

Student Tasks	Common Core Standards Applications
Steps 3 and 4: Draw students' attention to the **Blackberry Prediction Chart**. Use the questions on page 88 of the **Teachers' Edition** to facilitate a discussion about blackberries. Have students write a summary of their predictions in the "Predictions" column on **Nonnative Species**. Students turn to **Consequences of Introductions** (Student Edition, page 9). Project **Consequences of Introductions** (Visual Aid #22). As a class, discuss the consequences and add them to the "Consequences" column of **Nonnative Species**.	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on discipline-specific content.
Step 5: Display **Feral Goats** (Information Card #2), **Black Rats** (Information Card #3), and **Red Fire Ants** (Information Card #4). Have students work with a partner to discuss each species and complete their **Nonnative Species** chart independently. Remind students to refer to the **World** wall map as they complete the "former barrier" columns. Students should include three predictions in the "predictions" column before reading the summaries in **Consequences of Introductions** to complete the "consequences" column. ***Suggestion:*** *Students should use text and other resources to support their claims. Have students identify specifically which information they are using to make their predictions.*	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on discipline-specific content.
Steps 6 and 7: Review the chart **Nonnative Species** before assigning students the homework assignment, **Introduced Species** (Student Workbook, page 12).	**WHST.9–10.1:** Write arguments focused on *discipline-specific content*. **WHST.9–10.7:** Conduct…research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.9–10.8:** Gather relevant information from multiple authoritative…sources (**primary and secondary**)… **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Lesson 5: Island Species' Vulnerability

Students examine how El Niño events affect the flora and fauna of the Galápagos Islands. They study three animals and examine how rapid environmental changes affect these different island-dwelling organisms.


Lesson 5

Island Species' Vulnerability

Use this correlation in conjunction with the **Procedures** located on pages 110–112 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases…, choosing flexibly from a range of strategies. **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
Step 1: Point to the Galápagos Islands on the **World** wall map. Project and discuss **Overview of El Niño Phenomenon** (Visual Aid # 23) and **Rainfall Data** (Visual Aid #24).	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.
Steps 3 and 4: Students turn to **Island Species and Environmental Change** (Student Workbook, page 13). Project and compare **Land Iguana** (Visual Aid #25) and **Marine Iguana** (Visual Aid #26). Have students read the information about the marine iguana on **Island Species and Environmental Change**. Use the questions on page 110 of the **Teacher's Edition** to discuss how El Niño influences the habitat, food, and behavior of the marine iguanas. Have students complete the right-hand column "Potential Effects of El Niño on Island-dwelling Organisms" on **Island Species and Environmental Change**. Discuss student answers and have them circle the answer in the last column that correctly identifies the most significant effect of the rapid environmental change caused by El Niño.	**RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.

Student Tasks	Common Core Standards Applications
Steps 3 and 4 (Continued): ***Suggestion:*** *To encourage discussion, assign each student group one of the discussion questions below:* ■ *How does El Niño influence marine iguanas' habitat? (Freshwater accumulation in tide pools, increased erosion of rocky surfaces.).* ■ *How does El Niño influence their food source? (Decreased amounts of green and red algae due to warmer water, fewer nutrients from decreased upwelling, and/or increased freshwater.)* ■ *How can El Niño influence their behaviors, such as burrowing and egg laying? What might happen to ground burrows with increased rainfall? (The burrows might flood, and there might be increased erosion.)* ■ *What happens to the vegetation with increased rainfall? (It increases.)* ■ *How could this influence their burrowing? (Note: Refer them to the image of the burrow.) (Increased vegetation may* ■ *make it difficult for them to burrow.)* ■ *Why would El Niño affect marine iguanas on the Galápagos more than if this species lived on the mainland? (If iguanas lived on a continent, they might be able to migrate to find more food or habitat.)*	**RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
Steps 5 and 6: Project **Flightless Cormorant** (Visual Aid # 27) and **Galápagos Penguin** (Visual Aid # 28). Use the information provided on page 111 of the **Teacher's Edition** to describe each species. Students work with a partner to read and discuss the information on both species on **Island Species and Environmental Change**. Students complete the final column on their charts and circle the answer that most correctly identifies the significant effect of changes caused by El Niño. Project **Population Changes and El Niño** (Visual Aid #29). Review and discuss student answers. Allow students to make corrections/additions to the last column on **Island Species and Environmental Change**. Use the information on pages 111–112 of the **Teacher's Edition** to guide a discussion of El Niño effects on limited populations. Project and review **Island Species and Environmental Change** (Visual Aid #30) and have students correct any misconceptions.	**RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form… and translate information expressed visually…into words. **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.
Steps 7 and 8: On the board, make a list of why many species on the Galápagos Islands are affected so dramatically by rapid environmental changes. Provide each student with an index card. Have the students write "smaller" on one side and "larger" on the other. Use the questions on page 112 of the **Teacher's Edition** to guide a discussion on the sensitivity of island populations to rapid environmental changes. Students respond by holding up their card with the correct answer. Students turn to **Why Island Species Have an Increased Susceptibility** (Student Workbook, page 14), read the prompt, and write a response.	**SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one–on-one, in groups, and teacher led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively. **WHST.9–10.1:** Write arguments focused on *discipline-specific content*. **WHST.9–10.7:** Conduct…research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Student Tasks	Common Core Standards Applications
Steps 7 and 8 (Continued):	**WHST.9–10.8:** Gather relevant information from multiple authoritative…sources (**primary and secondary**)… **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Unit Assessment

Refer to the introduction pages at the front of this document for information regarding the Traditional and Alternative Assessments for this unit and their Common Core correlations.

Reading *California Connections* using a Common Core Reading and Writing Focus

Reading

Science teachers can further enhance the teaching of Common Core Reading Literacy Standards by noting the suggestions below and in the following pages while reading the ***California Connections*** selection for content. Explicitly teach students to pay attention to the structure of the text by noting the following:

- Note how the author cites evidence to support main points; note any gaps or inconsistencies. **(RST.9–10.1** and **RST.11–12.1)**
- Note how the author sets up the central ideas or conclusions; trace the text's explanation or depiction of a process or concept; summarize concepts, processes, and information by paraphrasing the text and the text as a whole. **(RST.9–10.2** and **RST.11–12.2)**
- Note how the author explains multi-step procedures. **(RST.9–10.3** and **RST.11–12.3)**
- Note how the author explains the meaning of key terms, symbols, domain specific words, and phrases. **(RST.9–10.4** and **RST.11–12.4)**
- Analyze the structure of the relationships among concepts in a text, and the relationships among key terms, including categories or hierarchies. **(RST.9–10.5** and **RST.11–12.5)**
- Analyze the author's purpose in providing an explanation, or describing a procedure, and how this defines the question the author seeks to address; identify important unresolved issues. **(RST.9–10.6** and **RST.11–12.6)**
- Note how the information in the ***California Connections*** text integrates with information provided throughout the unit in diverse formats, including tables, charts, maps, and quantitative data. **(RST.9–10.7** and **RST.11–12.7)**
- Assess the extent to which the reasoning and evidence in a text support the author's claim; evaluate the analysis and conclusions in the text. **(RST.9–10.8** and **RST.11–12.8)**
- When other documents are included, compare and contrast findings presented in this text to those in other sources, noting when the findings support or contradict previous explanations. **(RST.9–10.9** and **RST.11–12.9)**
- Note comprehension strategies for understanding text. **(RST.9–10.10** and **RST.11–12.10)**

Note: *Standard descriptions are paraphrased using a mix of grades 9–10/11–12 terminology that applies to reading a* ***California Connections*** *selection.*

Writing

Many ***California Connections*** selections can be used as a model for future student writing tasks applying the Writing Literacy Standards by noting how the author structures the text, organizes the ideas, and provides well-chosen relevant and sufficient facts, extended definitions, concrete details, quotations, or other information and examples.

The following pages feature the ***California Connections*** selection, identifying specific locations in the text that demonstrate Common Core Reading and Writing Literacy Standards for Science and Technical subjects.

Using the *California Connections* Selection

The following pages note specific places where the ***California Connections*** selection provides examples for specific Writing Literacy Standards for Science and Technical Subjects, using this selection as a writing model. They also provide suggestions for teaching students to analyze text structure using the Reading Literacy Standards for Science and Technical Subjects. Teachers can incorporate more suggestions from the list above.

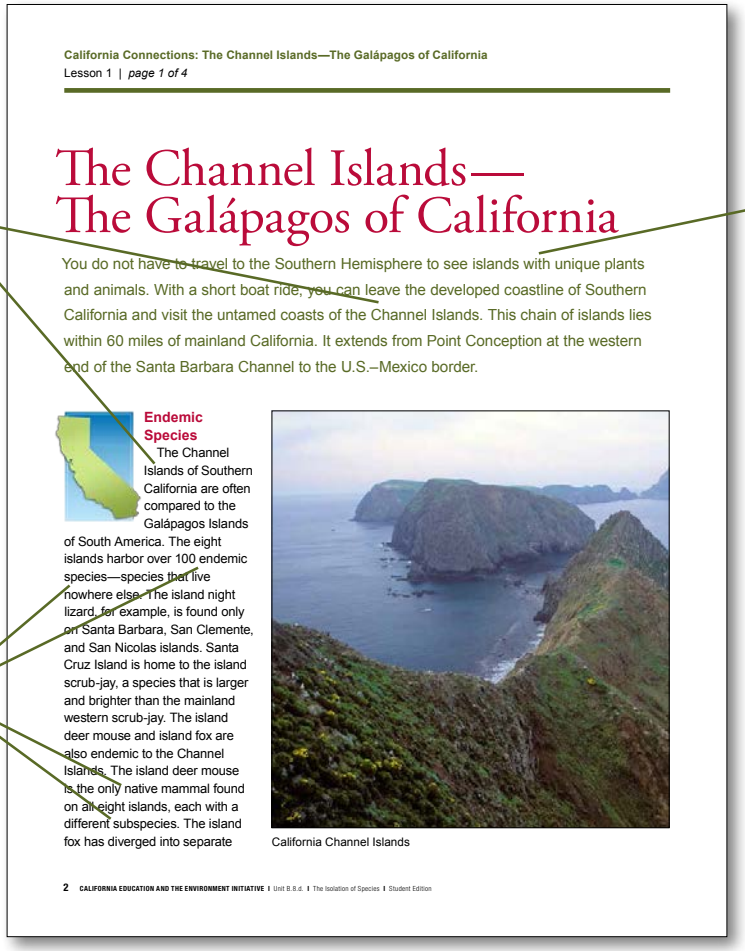
RST.9–10.10: …read and comprehend science/ technical texts…independently and proficiently.

WHST.9–10.2a: Introduce a topic and organize ideas…

Suggestion: *Discuss with students how the introduction sentences are used to capture the reader's attention.*

RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases…

- *Species*
- *Endemic*
- *Native*
- *Subspecies*



California Connections: The Channel Islands—The Galápagos of California
Lesson 1 | *page 1 of 4*

The Channel Islands— The Galápagos of California

You do not have to travel to the Southern Hemisphere to see islands with unique plants and animals. With a short boat ride, you can leave the developed coastline of Southern California and visit the untamed coasts of the Channel Islands. This chain of islands lies within 60 miles of mainland California. It extends from Point Conception at the western end of the Santa Barbara Channel to the U.S.–Mexico border.

Endemic Species

The Channel Islands of Southern California are often compared to the Galápagos Islands of South America. The eight islands harbor over 100 endemic species—species that live nowhere else. The island night lizard, for example, is found only on Santa Barbara, San Clemente, and San Nicolas islands. Santa Cruz Island is home to the island scrub-jay, a species that is larger and brighter than the mainland western scrub-jay. The island deer mouse and island fox are also endemic to the Channel Islands. The island deer mouse is the only native mammal found on all eight islands, each with a different subspecies. The island fox has diverged into separate

California Channel Islands

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RST.9–10.5: Analyze the structure of the relationships among concepts in a text…

Suggestion: *This sentence sets up the structure of this text. Have students trace its development while reading.*

RST.9–10.1: Cite specific textual evidence to support analysis of science…texts, attending to the precise details of explanations or descriptions.

Suggestion: *While reading, have students summarize sections of the material, citing evidence from the text.*

WHST.9–10.2a: …include formatting (e.g., headings)… when useful to aiding comprehension.

Suggestion: *Have students create a timeline with visual reminders of the events found in the selection.*

RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words or phrases…

- *population*
- *traits*

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subspecies on the six islands where it lives. The islands support many endemic plants, including island ironwoods and island oaks, giant buckwheat, and varieties of manzanita, milk-vetch, bedstraw, lotus, and phacelia. Because these plants and animals are endemic to these islands, they are parts of one of Earth's most endangered ecosystems.

Island deer mouse

Allopatric Speciation

Unique organisms like these develop through allopatric speciation, a type of divergent evolution. This process occurs when one population of species is split into two populations that then become isolated from each other for a long time. The formation of new species takes place when the two populations are exposed to different environmental conditions and selection pressures. Since these populations are isolated from one another they no longer interbreed. As a result, over a long period of time, natural selection can result in changes to the genetic makeup of each population—the selected traits will not be shared between populations. As the isolation continues, each population will evolve its own set of traits that are different from the traits in the other population. After a long time, even if the two populations come into contact with each other, they will no longer be able to successfully reproduce and produce fertile offspring. As such, they will have become separate species.

The fox populations of the northern Channel Islands provide a clear example of allopatric speciation. The four northern islands—San Miguel, Santa Rosa, Santa Cruz, and Anacapa—were connected during the Pleistocene Ice Age, approximately 18,000 years ago—when sea levels were significantly lower. When joined together, these four islands formed one large island known now as Santarosae. This island was home to the endemic island fox, a species that had evolved from the mainland gray fox. When sea levels rose, only the higher elevations of Santarosae remained above water, dividing the large island into four separate islands. This event isolated the fox populations of the "new" islands.

There are differences among the four islands, and each population adapted to its island's environmental conditions. After a long period of separation, the populations each developed unique traits. For example, each island's fox species has a different number of tail vertebrae. There is other evidence of divergence in the island fox populations. Eventually, these isolated island fox subspecies could evolve into separate species.

In general, islands farther from the nearest mainland area have more endemic species—this is true for many

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RST.9–10.8: Assess the extent to which the reasoning and evidence in a text support the author's claim…

Suggestion: *Ask students if the claims made by the author are supported by the text.*

RST.9–10.2: …trace the text's explanation…of a…concept…

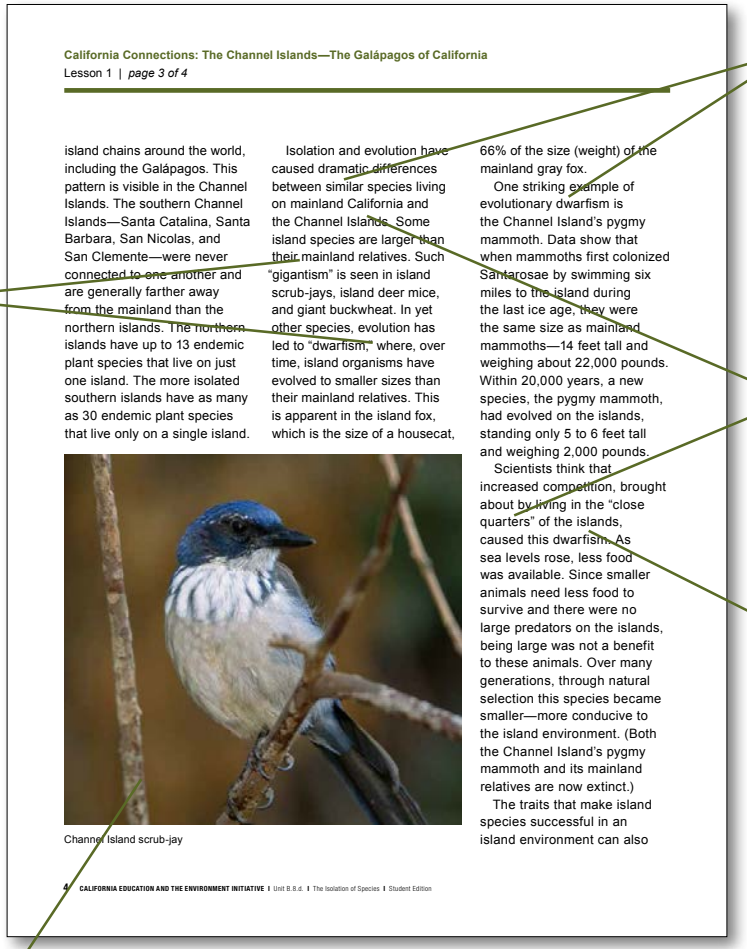
RST.9–10.6: Analyze the author's purpose in providing an explanation…

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,…or other information and examples…

RST.9–10.1: Cite specific textual evidence to support analysis of science…texts, attending to the precise details of explanations or descriptions.

Suggestion: *While reading, have students summarize sections of the material, citing evidence from the text.*

RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases…



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island chains around the world, including the Galápagos. This pattern is visible in the Channel Islands. The southern Channel Islands—Santa Catalina, Santa Barbara, San Nicolas, and San Clemente—were never connected to one another and are generally farther away from the mainland than the northern islands. The northern islands have up to 13 endemic plant species that live on just one island. The more isolated southern islands have as many as 30 endemic plant species that live only on a single island.

Isolation and evolution have caused dramatic differences between similar species living on mainland California and the Channel Islands. Some island species are larger than their mainland relatives. Such "gigantism" is seen in island scrub-jays, island deer mice, and giant buckwheat. In yet other species, evolution has led to "dwarfism," where, over time, island organisms have evolved to smaller sizes than their mainland relatives. This is apparent in the island fox, which is the size of a housecat, 66% of the size (weight) of the mainland gray fox.

One striking example of evolutionary dwarfism is the Channel Island's pygmy mammoth. Data show that when mammoths first colonized Santarosae by swimming six miles to the island during the last ice age, they were the same size as mainland mammoths—14 feet tall and weighing about 22,000 pounds. Within 20,000 years, a new species, the pygmy mammoth, had evolved on the islands, standing only 5 to 6 feet tall and weighing 2,000 pounds.

Scientists think that increased competition, brought about by living in the "close quarters" of the islands, caused this dwarfism. As sea levels rose, less food was available. Since smaller animals need less food to survive and there were no large predators on the islands, being large was not a benefit to these animals. Over many generations, through natural selection this species became smaller—more conducive to the island environment. (Both the Channel Island's pygmy mammoth and its mainland relatives are now extinct.)

The traits that make island species successful in an island environment can also

Channel Island scrub-jay

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WHST.9–10.2a: … include…graphics…and multimedia when useful to aiding comprehension.

WHST.9–10.2c: Use varied transitions and sentence structure to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,…or other information and examples…

Suggestion: *Have students identify how the example paragraph provides supporting details, examples, and evidence.*

WHST.9–10.2f: Provide a concluding statement or section that follows from and supports the information or explanation presented…

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,…or other information and examples…

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make them vulnerable to extinction. Because their gene pool is small, island species do not have much resilience if environmental changes occur. If a disaster occurs—such as the introduction of a disease—a species can go extinct in a short time span. This almost happened to island foxes living on Santa Catalina Island. When canine distemper virus was introduced to the population by a racoon, 90% of the fox's population died out within a year.

Introduced Species

The introduction of nonnative species can also affect the survival of endemic populations on islands. One-fourth of all plant species on the islands today are "introduced" species. Many of these newly introduced species outcompete native plants for space and water. Native plants are no match for the herbivores, such as goats, rabbits, deer, and pigs, that were introduced to the islands. Many of the islands' animal species evolved without any major predators. If a predator is introduced to the island, native species may not have the behavioral traits that would help them survive. Feral cats and black rats eat seabird and songbird eggs and chicks. Likewise, introduced species may damage the habitat. Introduced wild pigs have destroyed large quantities of native vegetation, causing erosion.

Richness of the Channel Islands

All organisms are the result of millions of years of mutation, random chance, and natural selection. Once a species is gone, it is gone forever. The Channel Islands are among the world's most precious resources. They provide essential breeding grounds for over 90% of the seabirds in Southern California. They also offer sanctuary for a rich diversity of marine life. Many threatened and endangered species exist in the Channel Islands and their surrounding waters. These islands are "living laboratories" of evolution.

Feral pig

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RST.9–10.8: Assess the extent to which the reasoning and evidence in a text support the author's claim…

Suggestion: Pose the following questions to students:

- *Does the reasoning and evidence in the text support the author's claims?*
- *Cite the specific supporting reasoning and evidence.*
- *Cite any gaps in reasoning or evidence.*

RST.11–12.7: Integrate and evaluate multiple sources of information…

Suggestion: *Note how the information from* ***California Connections*** *integrates with information provided in the rest of the unit.*

California Common Core State Standards Descriptions for Grades 9–10

Language Standards

- **L.9–10.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grades 9–10 reading and content*, choosing flexibly from a range of strategies.

Reading Standards for Literacy in Science and Technical Subjects

- **RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
- **RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
- **RST.9–10.6:** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- **RST.9–10.8:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- **RST.9–10.10:** By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

Speaking and Listening Standards

- **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 9–10 topics, texts, and issues,* building on others' ideas and expressing their own clearly and persuasively.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

- **WHST.9–10.1:** Write arguments focused on *discipline-specific content.*
- **WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
  a) Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
  b) Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
  c) Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
  d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
  f) Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
- **WHST.9–10.7:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

- **WHST.9–10.8:** Gather relevant information from multiple authoritative print and digital sources **(primary and secondary),** using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. **CA**
- **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

California Common Core State Standards Descriptions for Grades 11–12

Reading Standards for Literacy in Science and Technical Subjects

- **RST.11–12.7:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.